N PAKISTAN JOURNAL OF UTRITION

Factors That Affect Body Mass Index of Adults

Esma Asil, Metin Saip Surucuoglu, Funda Pinar Cakiroglu, Asli Ucar,
Ayse Ozfer Ozcelik, Mustafa Volkan Yilmaz and Lale Sariye Akan
Department of Nutrition and Dietetics, Faculty of Health Sciences, Ankara University, Ankara, Turkey

Abstract: The aim of the study is to determine the factors that contribute to the body mass index (BMI) of adults and evaluate the eating habits of the individuals. The study was conducted on 498 adults whose ages were ranging from 20 to 85 (39.1±14.9 year). The data were collected using a questionnaire form that consisted of questions concerning general characteristics of individuals, frequency of food consumption and eating habits. Food types in the food consumption frequency were grouped together according to Nutrition Guide for Turkey. Body weights and heights of the individuals were measured. BMI of the 55% of the individuals participated in the study is 25 or higher than 25. The average BMI of the individuals differs according to age, educational, marital, smoking status, parity and sleep duration (p<0.05). According to standardized regression coefficient; factors affecting BMI in the order of importance are: age (p<0.001), educational (p<0.001), marital (p<0.001), smoking status (p<0.05) and sleep duration (p>0.05). A statistically significant correlation was found between BMI of participants and their habit of eating at night, appetite and use of sweeteners (p<0.05). Individuals with BMI<25 were determined to have a lower consumption frequency of milk and dairy products and fruits-vegetables monthly (p<0.05). In this study; age, educational, marital, smoking status and sleep duration were found to affect body mass index. Analysis of genetic and environmental factors affecting obesity is required to reveal the factors affecting body mass index of individuals more clearly.

Key words: Body mass index, obesity, nutrition, Turkey

INTRODUCTION
Obesity is one of the important health problems observed worldwide (Shub et al., 2013). In developed and developing countries, increased prevalence of obesity is indicated in all age groups and especially in women (Khokhar et al., 2010).

Extensive studies in Turkey also show an increase in the prevalence of obesity in our country (Satman et al., 2010; Yumuk, 2005). According to the results of "Turkish Diabetes, Hypertension, Obesity and Endocrinological Diseases Prevalence Study II (TURDEP-II)" obesity prevalence increased by 44% and reached to 32% between 1998-2010 (Satman et al., 2010). The study of "Cardiac Disease and Risk Factors in Turkish Adults (TEKHARF)", which is also a community based study, determined that 18.6% obesity prevalence in 1990 was increased to 21.9% in 2000 (Yumuk, 2005).

Obesity has an important role in the development of various chronic diseases, especially cardiological and endocrinological diseases (Altunkaynak and Ozbek, 2006; Dressler and Smith, 2013; Goodpaster et al., 2010; Kehoe et al., 2013; Nijamkin et al., 2012). In epidemiological studies, an important correlation was found between obesity and mortality (Peeters et al., 2003; Calle et al., 1999; Lee et al., 1993). In Framingham Cardiac Study, which has an important role in the identification of cardiovascular disease risk factors and determination of avoidance strategies, after 14 years of follow-up; an increase of 1 kg/m² in body mass index (BMI) was found to increase heart failure rate by 7% in women and 5% in men (Kenchaiah et al., 2002). High BMI is also known to be correlated with hypertension and hyperlipidemia (Brown et al., 2000).

Various factors such as eating habit (Simsek et al., 2005), educational background, socioeconomic status (Dressler and Smith, 2013; Ball and Crawford, 2005), working condition (Arslan and Ceviz, 2007) cultural features of individuals are observed to have an effect on etiology of obesity. As a result, it is stated that obesity and obesity induced chronic diseases can be avoided by alteration of diet and life style in developed and developing countries (Adriaanse et al., 2011; Miller et al., 2010; Sodergren et al., 2014).

In the light of these results, this study aims to determine the factors affecting body mass index of adults and evaluate the eating habits of individuals.

MATERIALS AND METHODS
Participants: The study was conducted on 498 adults, ages ranging from 20 to 85 (39.1±14.9 year), who consulted the 7 health centers in the center of Ankara. Study data was collected face to face using questionnaire forms between June and July, 2010.

Corresponding Author: Esma Asil, Department of Nutrition and Dietetics, Faculty of Health Sciences, Ankara University, Ankara, Turkey

Before the study, participants were informed about the study and volunteers who accepted to participate in the study were included.

Questionnaire form: The questionnaire from used in the study includes general information about the individuals, questions aim to determine eating habits of individuals and the frequency of food consumption. Foods in food consumption frequency were classified as every meal, every day, 5-6 a week, 3-4 a week, 1-2 a week, once in 15 days, once in a month and never. Monthly consumptions were calculated on daily basis according to the answers of individuals (every meal: 90 days/month, every day: 30 days/month, 5-6 a week: 23.5 days/month, 3-4 a week: 15 days/month, 1-2 a week: 6.43 days/month, once in 15 days: 2 days/month, once in a month: 1 days/month, never:0). Food types in the food consumption frequency were evaluated and grouped together according to Nutrition Guide for Turkey (The Ministry of Health of Turkey, 2006).

Anthropometric measurements: Body weights of the participants were calculated lightweight outfit on and without shoes by a portable bathroom scale that is sensitive to till 0.1 kg. For height measurements, individuals stand with their feet side by side, head, hip and heels touching the wall and Frankfort measurement was used (Lohman *et al.*, 1992). Body mass index of individuals (kg/m^2) were evaluated according to World Health Organization's (WHO) classification: below 18.5 underweight, 18.5-24.99 normal, 25.0-29.99 overweight, 30.0 and above 30.0 obese (WHO, 2008).

Statistical analysis: Data obtained from the study was evaluated using SPSS (Statistical Package for Social Sciences) program. The study data were shown tabular with percentage values. For the analysis of the findings, chi-square, Independent Samples-T, One Way ANOVA significance tests and LSD test was applied. For the determination of the factors affecting body mass index, multiple regression analysis was performed.

RESULTS

A total of 498 individuals, 204 men and 294 women, participated in the study, 55.0% of them had 25 or higher BMI. A percentage of 40.7% of men and 44.6% of women were found to have normal body weight (Table 1).

Average BMI varies by age, educational status, marital status, parity ($p<0.001$), smoking status and sleep duration ($p<0.05$) (Table 2). Average BMI was found to increase with age ($p<0.001$), decrease with the increasing degree of educational status and increase with the number of births given by women. It is also lower in single individuals compared to married or widows. Average BMI is lower in participants with daily sleep duration <8 h ($p<0.05$) and television (TV) watching duration <2 h ($p>0.05$).

A statistically significant correlation ($p<0.05$) was found between BMI and habit of eating at night, appetite status ($p<0.001$) and use of artificial sweeteners in individuals participated in the study ($p<0.05$) (Table 3).

In the study, women were found to use light products (low-fat and/or low-sugar) more than men (respectively, 31.3%, 13.7%, $X^2 = 20.32$, $p = 0.000$) and among the light products, semi-skimmed or skimmed milk and milk products were determined to be consumed most (69.2%).

According to standardized regression coefficient, the relative order of importance of the factors affecting BMI: age, educational background, marital status, smoking status and sleep duration (Table 4). When t test results regarding significance of regression coefficient were analyzed, the effects of age, educational background, marital status, smoking status and sleep duration on BMI were conferred significant. Overall evaluated factors explain 34% of BMI. It was found that the correlation between BMI and age ($r = 0.49$) and educational background ($r = -0.43$) was moderate; yet the level of correlation decreased when the other variables were maintained (respectively, $r = 0.35$, $r = -0.24$).

When the food consumption frequency of the participants were evaluated with respect to food groups; individuals with BMI<25 in comparison with individuals with BMI = 25.0 were determined to show less frequency of milk and dairy products consumption (respectively, 16.0±6.5 days/month, 17.6±7.9 days/month) ($p<0.05$) and fruit and vegetables (25.7±14.6 days/month, 29.2±14.3 days/month) ($p<0.05$) (Table 5).

DISCUSSION

Currently, obesity and obesity induced chronic diseases are outstanding among health problems of many countries (Nijamkin *et al.*, 2012). This situation led the studies aiming avoidance and control of obesity to come into prominence. Throughout the world, 35% of individuals at the age of 20 or older were indicated as mildly fat, 11% were indicated as obese (WHO, 2008). In this study, 37.6% of the participants were found to be mildly fat and 17.4% to be obese. Average BMI was found not to vary by gender ($p>0.05$), but to vary

Table 1: BMI distribution of the participants according to gender (%)

Gender	n	Underweight	Normal	Overweight	Obese
Male	204	-	40.7	46.1	13.2
Female	294	3.4	44.6	31.6	20.4
Total	498	2.0	43.0	37.6	17.4

Table 2: Factors affecting average BMI of the participants

	%	$\overline{X} \pm SD$	p
Gender			
Male	41.0	25.9±3.9	
Female	59.0	25.9±5.3	0.953
Age groups (years)			
20-29	35.9	22.7±3.4ᵃ	
30-39	19.7	26.6±3.1	
40-49	19.1	27.3±3.8	0.000*
50 ≤	25.3	28.9±4.9ᵇ	
Educational status			
Illiterate	7.0	31.4±5.5ᵃ	
Elementary school	26.7	28.0±4.1ᵇ	0.000*
High School	39.4	24.5±4.3ᶜ	
Bachelors degree	26.9	24.5±3.9	
Working status			
Employment	34.9	26.1±5.2	0.301
Unemployment	65.1	25.7±3.9	
How they spent their day			
Standing	26.1	25.7±4.0	
Sitting	24.1	25.5±4.2	0.920
Standing-sitting	49.8	25.8±3.5	
Marital status			
Married	61.8	27.4±4.3	
Single	29.9	22.6±3.8ᵃ	0.000*
Widow	8.2	27.0±4.8	
Births number (n = 198)			
1-2	19.9	26.5±4.5ᵃ	
3-4	13.1	28.1±3.8ᵇ	0.000*
5 ≤	6.8	31.1±5.3ᶜ	
Smoking			
Never	49.4	26.2±5.3	
Former	16.1	26.7±4.3	0.016ᵝ
Current	34.5	25.1±4.0ᵃ	
Regular physical activity			
Yes	43.2	25.9±4.8	0.733
No	56.8	25.8±4.6	
Sleeping duration (h/day)			
≤ 8	83.3	25.7±4.5	
> 8	16.7	26.9±4.9	0.038ᵝ
TV watching duration (h/day)			
≤ 2	36.1	25.7±4.5	
2-4	36.3	26.1±4.9	0.767
4<	27.5	26.0±4.8	

* p < 0.01, ᵝp < 0.05
ᵃ,ᵇ,ᶜdatas that have different characters in same column are statistically different.

significantly by age, educational background, marital status, parity (p<0.001), smoking status and sleep duration (p<0.05).

Decrease in physical activity and slowing down of metabolism by age or physiological alterations in women following menopause may cause increase in the body weight (Fouad *et al.*, 2006). Similar to the many conducted studies, significant increase of average BMI with age was determined in this study (p<0.001) (Stene *et al.*, 2001; Fouad *et al.*, 2006).

It was shown in the conducted studies that educational backgrounds of individuals affect their eating habits positively (Sharma *et al.*, 2008; Carlsson *et al.*, 2013). It is explicitly seen in this study too that BMI of individuals significantly decrease with increasing level of education (p<0.001).

Table 3: Average BMI values according to eating habits of individuals

	%	$\overline{X} \pm SD$	p
Skipping meal			
Yes	55.6	25.6±4.9	0.053
No	44.4	26.4±4.6	
Speed of eating			
Normal	39.4	25.7±4.7	
Fast	39.4	26.3±4.5	0.434
Slow	21.3	25.7±5.3	
Eating night			
Every night	10.4	24.7±4.6	
Often	49.6	25.1±4.6	0.000*
Never	40.0	26.9±4.7ᵃ	
Appetite			
Have much appetite	31.5	27.6±4.3ᵃ	0.000*
Normal	63.3	25.3±4.7ᵇ	
Have no appetite	5.2	23.2±4.9ᶜ	
Light products use			
Yes	24.1	26.5±5.3	0.196
No	75.9	25.8±4.6	
Artificial sweeteners use			
Yes	5.2	28.3±4.9	0.009ᵝ
No	94.8	25.8±4.7	

*p<0.001, ᵝp <0.05
ᵃ,ᵇ,ᶜdatas that have different characters in same column are statistically different.

Besides education, employment status is also a factor that affects body weights of individuals. In a study conducted on this topic, it was found that working women had a significantly lower body mass index and better eating habits compared to housewives (Arslan and Ceviz, 2007). It is also known that obesity risk is higher for individuals with sedentary jobs (Mummery *et al.*, 2005). However, we found in our study that average BMI and job status of participants were similar and the time they spent daily sitting or standing did not have an effect on BMI (p>0.05).

Events such as marriage, divorce or loss of partner which change the social roles affect individuals' body weights (Ball and Crawford, 2005). It is found in this study that single individuals have a significantly lower BMI compared to married or widow individuals (p<0.001). The percentage of participants who stated that they gained weight after marriage was 31.5%. A similar result was obtained in the NHEFS study made in the United States of America. According to the study; in the 10 years of follow-up, gain of weight was more commonly observed in the women getting married and loss of weight was more commonly observed in men getting divorced or becoming widow (Sobal *et al.*, 2003). Pregnancy or gain of excessive weight during pregnancy triggers development of obesity especially in women with bad eating habits (Jaakkola *et al.*, 2013l; Rooney and Schauberger, 2002). It is determined in our study too that average BMI of participants significantly increase following childbirth.

Regular physical activity is known to have an active role in body weight control. In a study conducted on male adolescents, it was found that physical activity has a

Table 4: Multiple regression analysis results with respect to evaluation of body mass index

	B	SE	Beta	t	p	r	Partial r
Constant	27.64	1.58	-	17.45	0.000	-	-
Age	0.11	0.01	0.36	8.39	0.000*	0.49	0.35
Education status	-0.83	0.15	-0.23	-5.52	0.000*	-0.43	-0.24
Marital status	-1.45	0.27	-0.19	-5.28	0.000*	-0.27	-0.23
Smoking status	-0.43	0.19	-0.08	-2.181	0.030[ß]	-0.10	-0.9
Sleeping duration	0.07	0.12	0.022	0.59	0.550	0.06	0.03

$R = 0.584$, $R^2 = 0.341$, $p = 0.000$ * $p<0.001$, [ß]$p<0.05$

Table 5: Food groups consumption frequency distributions of the participants according to BMI (days/month)

	$\overline{X} \pm SD$ (day/month)		
Food groups	BMI<25.0 (n:224)	BMI $\geq$ 25.0 (n:274)	p
Milk and dairy products	16.0±6.5	17.6±7.9	0.017*
Meat and meat products	7.7±4.1	7.6±4.2	0.827
Bread and other cereals	12.5±5.9	12.2±5.0	0.587
Fruit and vegetables	25.7±14.6	29.2±14.3	0.009*
Oils	11.4±5.2	11.7±6.7	0.544
Sugar- sugar added food	23.6±13.6	24.7±17.2	0.421

* $p<0.05$

more prominent effect on body mass index compared to eating habits (Al-Haifi et al., 2013). Chau et al. (2012) also suggested that the total time working individuals spend sitting daily and their physical activity habits independently affect obesity. However, it is found in the same study that regular physical activity habits of individuals do not have an influence on average BMI (p>0.05). This implies that the participants did not perform physical activity regularly enough to affect their body weights.

Similar to obesity, smoking is another important risk factor for metabolic syndrome, diabetes and cardiovascular diseases. Smoking increases insulin resistance and results in increased of abdominal fat deposition (Pisinger et al., 2009). In addition, smokers were shown to have lower BMI compared to non-smokers in many studies despite their food consumption is in the same level with that of non-smokers or even slightly higher (Molarius et al., 1997, Pisinger et al., 2009). These findings are attributed to the influence of nicotine in the cigarette on the various metabolic processes in the body (Pisinger et al., 2009). Similarly, smokers were found to have a significantly lower average BMI in our study too (p<0.05).

In the conducted studies the habit of eating late in the night, which is stated to be a cause for individuals to fail in their weight-loss diet, is suggested to be seen commonly especially in obese individuals (Marchesini et al., 2013). When eating habits of individuals participating in the study were questioned, individuals with normal body weight were found to have a more prominent habit of eating late in the night (p<0.05). This result obtained in our study suggests that the types or the amounts of foods that the individuals consume should be questioned as well.

In a study conducted on university students, participants with normal BMI were found to consume light products (low-fat and/or low-sugar) or sweeteners more in order to maintain their weights (Malinauskas et al., 2006). In another performed study, the increase of weight in individuals who used artificial sweeteners for longer periods were observed to be greater compared to those who did not (Fowler et al., 2008). In this study, individuals who use sweeteners (p<0.05) and light products (low-fat and/or low-sugar) were determined to have a higher average BMI (p>0.05). This suggests a deduction can be made that light products are consumed more with the idea that they are low-energy.

Food are divided into four basic groups as milk and dairy products (milk, yoghurt etc.), meat group (meat, poultry, fish, egg, legumes), bread and other cereal group (grain products, bread, pasta etc.) and fruit-vegetable group in the Nutrition Guide for Turkey (The Ministry of Health of Turkey, 2006). It is advised to consume sufficient amount of all food groups daily for a healthy diet. In our study, it is determined that individuals with BMI<25.0 consume dairy products 16.0±6.5 days a month and individuals with BMI = 25 consume 17.6±7.9 days a month (p<0.05). When fruit-vegetable consumption of participants were compared, a similar result was obtained as individuals with BMI<25 had a lower consumption frequency (25.7±14.6 days/month, 29.2±14.3 days/month; p<0.05). In a study conducted in Syria, it was found that individuals with BMI <25 had a higher frequency of fruit-vegetable consumption (IM et al., 1993). In addition, participants in both groups were determined to have a high frequency of sugar and sugared food consumption (23.6±13.6, 24.7±17.2; p>0.05)

In this study, frequency of food consumption individuals in the last 6-month period were recorded but their consumption amounts were not questioned. For this reason, whether their food consumption was in the suggested level or not was not evaluated. However, the fact that the individuals did not consume 4 basic food groups every day suggests that they did not meet their

needs adequately. Food consumption records of individuals should be taken in the further studies.

Conclusion: In this study, it is determined that age, educational background, marital status, smoking status and sleep duration could explain 34% of the mean body mass index of individuals. Genetic and environmental factors that have an influence on obesity are needed to be studied in order to more clearly present the factors that affect individuals' body weight.

REFERENCES

Adriaanse, M.A., C.D. Vinkers, D.T. De Ridder, J.J. Hox and J.B. De Wit, 2011. Do implementation intentions help to eat a healthy diet? A systematic review and meta-analysis of the empirical evidence. Appetite, 56: 183-193.

Al-Haifi, A.R., M.A. Al-Fayez, B.I. Al-Athari, F.A. Al-Ajmi, A.R. Allafi, H.M. Al-Hazzaa and A.O. Musaiger, 2013. Relative contribution of physical activity, sedentary behaviors and dietary habits to the prevalence of obesity among kuwaiti adolescents. Food Nutr. Bull., 34: 6-13.

Altunkaynak, B.Z. and E. Ozbek, 2006. Obezite: Nedenleri ve tedavi secenekleri. Van Tip Dergisi, 13: 138-142.

Arslan, C. and D. Ceviz, 2007. Ev hanimi ve calisan kadinlarin obezite prevalansi ve saglikli yasam bicimi davranislarinin degerlendirilmesi. Firat Universitesi Saglik Bilimleri Tip Dergisi, 21: 211-220.

Ball, K. and D. Crawford, 2005. Socioeconomic status and weight change in adults: A Review. Social Sci. and Med., 60: 1987-2010.

Brown, C.D., M. Higgins, K.A. Donato, F.C. Rohde, R. Garrison, E. Obarzanek, N.D. Ernst and M. Horan, 2000. Body mass index and the prevalence of hypertension and dyslipidemia. Obesity Res., 8: 605-619.

Calle, E.E., M.J. Thun, J.M. Petrelli, C. Rodriquez and C.W. Heath, 1999. Body-mass index and mortality in a prospective cohort of U.S. adults. N. Engl. J. Med., 341: 1097-1105.

Carlsson, A.C., P.E. Wändell, B. Gigante, K. Leander, M.L. Hellenius and U. De Faire, 2013. Seven modifiable lifestyle factors predict reduced risk for ischemic cardiovascular disease and all-cause mortality regardless of body mass index: A Cohort Study. Int. J. Cardiol., 168: 946-952.

Chau, J.Y., H.P. Van Der Ploeg, D. Merom, T. Chey and A.E. Bauman, 2012. Cross-sectional associations between occupational and leisure-time sitting, physical activity and obesity in working adults. Preventive Med., 54: 195-200.

Dressler, H. and C. Smith, 2013. Food choice, eating behavior and food liking differs between lean/normal and overweight/obese, low-income women. Appetite, 65: 145-152.

Fouad, M.F., S. Rastam, K.D. Ward and W. Maziak, 2006. Prevalence of obesity and its associated factors in aleppo, Syria. Prevention and Cont., 2: 85-94.

Fowler, S.P., K. Williams, R.G. Resendez, K.J. Hunt, H.P. Hazuda and M.P. Stern, 2008. Fueling the obesity epidemic? Artificially sweetened beverage use and long-term weight gain. Obesity, 16: 1894-1900.

Goodpaster, B.H., J.P. Delany, A.D. Otto, L. Kuller, J. Vockley, J.E. South-Paul, S.B. Thomas, J. Brown, K. Mctigue and K.C. Hames, 2010. Effects of diet and physical activity interventions on weight loss and cardiometabolic risk factors in severely obese adults. JAMA. J. Am. Med. Assoc., 304: 1795-1802.

Jaakkola, J., P. Hakala, E. Isolauri, T. Poussa and K. Laitinen, 2013. Eating behavior influences diet, weight and central obesity in women after pregnancy. Nutr., 29: 1209-1213.

Kehoe, S.H., G.V. Krishnaveni, S.R. Veena, A.M. Guntupalli, B.M. Margetts, C.H.D. Fall and S.M. Robinson, 2013. Diet patterns are associated with demographic factors and nutritional status in south indian children. Maternal and Child Nutr., 10: 145-158.

Kenchaiah, S., J.C. Evans, D. Levy, P.W. Wilson, E.J. Benjamin, M.G. Larson, W.B. Kannel and R.S. Vasan, 2002. Obesity and the risk of heart failure. N. Engl. J. Med., 347: 305-313.

Khokhar, K.K., G. Kaur and S. Sidhu, 2010. Prevalence of obesity in working premenopausal and postmenopausal women of Jalandhar district, Punjab. J. Hum. Ecol., 29: 57-62.

Lee, I.M., J.E. Manson, C.H. Hennekens and R.S. Jr. Paffenbarger, 1993. Body weight and mortality. A 27-year follow-up of middle-aged men. JAMA, 270: 2823-2828.

Lohman, T., A. Roache and R. Martorell, 1992. Anthropometric standardization reference manual. Med. and Sci. Sports and Ex., 24: 952-954.

Malinauskas, B.M., T.D. Raedeke, V.G. Aeby, J.L. Smith and M.B. Dallas, 2006. Dieting practices, weight perceptions and body composition: a comparison of normal weight, overweight and obese college females. Nutr. J., 5: 1-8.

Marchesini, G., S. Calugi, R. Marzocchi and R. Dalle Grave, 2013. Night eating syndrome in obesity. Handbook of Nutrition, Diet and Sleep. Springer.

Miller, L.M.S., T.N. Gibson and E.A. Applegate, 2010. Predictors of nutrition information comprehension in adulthood. Pat. Edu. and Counsel., 80: 107-112.

Molarius, A., J.C. Seidell, K. Kuulasmaa, A.J. Dobson and S. Sans, 1997. Smoking and relative body weight: an international perspective from the who monica project. J. Epidemiol. and Comm. Health, 51: 252-260.

Mummery, W.K., G.M. Schofield, R. Steele, E.G. Eakin and W.J. Brown, 2005. Occupational sitting time and overweight and obesity in Australian workers. Am. J. Preventive Med., 29: 91-97.

Nijamkin, M.P., A. Campa, J. Sosa, M. Baum, S. Himburg and P. Johnson, 2012. Comprehensive nutrition and lifestyle education improves weight loss and physical activity in hispanic americans following gastric bypass surgery: a randomized controlled trial. J. Acad. Nutr. and Dietetics, 112: 382-390.

Peeters, A., J.J. Barendregt, F. Willekens, J.P. Mackenbach, A. Al Mamun and L. Bonneux, 2003. Obesity in adulthood and its consequences for life expectancy: A life-table analysis. Ann. Int. Med., 138: 24-32.

Pisinger, C., U. Toft and T. Jorgensen, 2009. Can lifestyle factors explain why body mass index and waist-to-hip ratio increase with increasing tobacco consumption? The inter Study. Public Health, 123: 110-115.

Rooney, B.L. and C.W. Schauberger, 2002. Excess pregnancy weight gain and long-term obesity: one decade later. Obstetrics and Gynecology, 100: 245-252.

Satman, I., ve Calisma grubu, 2010. Turdep-II sonuclarinin ozeti, tc saglik bakanligi.

Sharma, S.V., A.D. Gernand and R.S. Day, 2008. Nutrition knowledge predicts eating behavior of all food groups except fruits and vegetables among adults in the paso del norte region: Que Sabrosa Vida. J. Nutr. Edu. and Behavior, 40: 361-368.

Shub, A., E.Y. Huning, K.J. Campbell and E.A. Mccarthy, 2013. Pregnant women's knowledge of weight, weight gain, complications of obesity and weight management strategies in pregnancy. BMC. Res. Notes, 6: 278.

Sobal, J., B. Rauschenbach and E.A. Frongillo, 2003. Marital status changes and body weight changes: A US longitudinal analysis. Social Sci. and Med., 56: 1543-1555.

Sodergren, M., W.C. Wang, J. Salmon, K. Ball, D. Crawford and S.A. Mcnaughton, 2014. Predicting healthy lifestyle patterns among retirement age older adults in the well study: A latent class analysis of sex differences. Maturitas, 77: 41-46.

Stene, L., R. Giacaman, H. Abdul-Rahim, A. Husseini, K. Norum and G. Holmboe-Ottesen, 2001. Original communications-obesity and associated factors in a palestinian west bank village population. Eur. J. Clin. Nutr., 55: 805-811.

Simsek, F., B. Ulukol, M. Berberoglu, S.B. Gulnar, P. Adiyaman and G. Ocal, 2005. Ankarada bir ilkogretim okulu ve lisede obezite sikligi. Ankara Universitesi Tip Fakültesi Mecmuasi, 58: 163-166.

The Ministry of Health of Turkey, 2006. Nutrition guide for Turkey. Onur Matbaacilik Ltd. Sti, Ankara.

WHO, 2008, Http://Www.Who.Ýnt/Mediacentre/ Factsheets/Fs311/En/Ýndex.Html.

Yumuk, V.D., 2005. Prevalence of obesity in Turkey. Obesity Rev., 6: 9-10.